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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,443	02/19/2002	Atsuhiro Ohkawa	030662-082	9882

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EXAMINER	
HON, SOW FUN	
ART UNIT	**PAPER NUMBER**
1772	

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/076,443	OHKAWA ET AL.	
	Examiner	Art Unit	
	Sow-Fun Hon	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 04 November 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-23 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11/04/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/04/04 has been entered.

Response to Amendment

Withdrawn Rejections

2. The 35 U.S.C. 112, 2nd paragraph and 103(a) rejections have been withdrawn due to Applicant's amendment dated 11/04/04.

New Rejections

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

4. Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larson (US 5,751,388) in view of Sekine et al. (US 6,149,837).

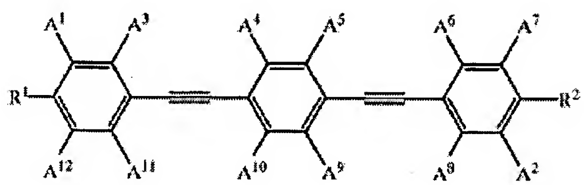
Regarding claims 1-8, 10, Larson teaches an optical polarized light scattering (PSSE) film comprises a support(ing substrate) (column 6, lines 40-50) and a PDLC layer (column 6, lines 50-55) which is linearly polarizing (column 10, lines 40-50). Larson teaches that the PDLC (PSSE)) layer transmits approximately 90 % via the pass axis and 30 % via the rejection axis, of the polarized light (column 7, lines 1-10), which means that the linearly polarizing layer selectively transmits polarized light and reflects or scatters other polarized light. The linearly polarizing layer (PDLC film) contains a liquid crystal compound (LC) with fixed alignment (maintain alignment geometry) (column 6, lines 45-55). Although Larson fails to teach that the support(ing substrate) (column 6, lines 40-50) for the linearly polarizing (PDLC) layer is transparent, a transparent support for an optical film component is highly desirable to one of ordinary skill in the art at the time the invention was made, in order not to interfere with the light transmission characteristics of the linearly polarizing layer.

Larson fails to teach the claimed formula (I) of the liquid crystal compound.

Sekine teaches an optical film comprising a polymer dispersed liquid crystal element layer (column 1, lines 1-20), and is directed to a liquid crystal display (column 3, lines 1-5).

Compound (1) of Sekine shown below, is the same as Applicant's formula (I). In Sekine, R^1 and R^2 each independently represent a hydrogen atom (rendering the end aromatic ring a monovalent one), a cyano group (column 3, lines 10-35) which yields an embodiment wherein: $Ar^1 = Ar^2 =$ monovalent aromatic group, and $Ar^3 =$ divalent aromatic hydrocarbon group in claims 1-2, 10.

(1)

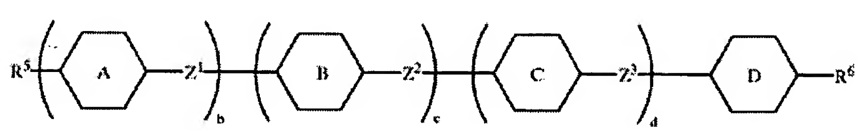


In the formula, A^1 to A^{12} each independently represent a hydrogen atom, a fluorine atom, or an alkyl group having 1 to 10 carbon atoms, and at least one is an alkyl group (provided that, in A^1 to A^{12}, the cases are excluded where both of A^1 and A^2 are methyl groups at the same time, while the others are hydrogen atoms, and where both of A^7 and A^{12} are methyl groups at the same time, while the others are hydrogen atoms); R^1 and R^2 each independently represent a hydrogen atom, a fluorine atom, a cyano group, a 4-R^3-(cycloalykyl) group, a 4-R^3-(cycloalkenyl) group, or a R^4—$(O)_q$ group (where R^3 represents a hydrogen atom, a linear or branched alkyl group having 1 to 12 carbon atoms which may be substituted by fluorine, a linear or branched alkenyl group having 2 to 12 carbon atoms which may be substituted by fluorine, or a linear or branched alkynyl group having 2 to 12 carbon atoms which may be substituted by a fluorine

Regarding claims 3-7, the embodiment of Ar^3 as a divalent aromatic group formed by connecting two or three groups hereof is a homolog of the single aromatic group taught by Sekine (column 3, lines 10-35), as discussed above.

The embodiment of Ar^3 as a divalent aromatic six-membered heterocyclic group or a divalent condensed aromatic six-membered heterocyclic group is the result of routine experimentation, well known to one of ordinary skill in the art at the time the invention was made, as demonstrated by Sekine.

(3)



Sekine teaches the liquid crystal compound (formula 3) above, wherein b = 1, c = 1, d = 0 (no C ring or Z^3 linking group), where A, B and D each independently represent 1, 4- phenylene

(six-membered aromatic hydrocarbon group), 2,5-pyrimidinediyl, 5,2-pyrimidinediyl, 2,5-dioxanediyl or 5,2-dioxanediyl (six-membered aromatic heterocylic groups), and R^5 and R^6 independently represent a hydrogen atom (rendering aromatic ring A or D a monovalent one), or a cyano group (rendering aromatic ring A or D a monovalent cyano-substituted one) (claim 6) (column 4, lines 35-65). Z^1 and Z^2 each independently represent an alkynylene group having 2 carbons (triple bond acetylene) (column 5, lines 1-10).

The embodiment of Ar^3 as a divalent aromatic five-membered heterocyclic group or a divalent condensed aromatic five-membered heterocyclic group is a homolog of the six-membered heterocyclic group taught by Sekine, as discussed above.

Regarding claim 8, Sekine teaches that the hydrogen atom on the aromatic ring is substituted by a halogen atom in order to improve compatibility with the other materials (liquid crystals) in the polarizing layer (column 2, lines 35-65). Therefore substitution of the hydrogen on the aromatic ring with a hydroxyl group is the result of routine experimentation for one of ordinary skill in the art at the time the invention was made, in order to improve compatibility with other liquid crystals having similar substitution groups.

Regarding claim 13, Sekine teaches that R^1 and R^2 can independently represent a linear or branched alkenyl group (column 4, lines 25-30), which is polymerizable.

Sekine teaches that the liquid crystal compound of formula (1) has a large anisotropy of refractive index (column 2, lines 65-70). Hence the layer is highly polarizing due to its large refractive index anisotropy. In addition, Sekine teaches that the compound is more advantageous in stability to light (column 3, lines 1-5).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the liquid crystal compound of Sekine as the liquid crystal in the PDLC film of Larson, in order to obtain a linearly polarizing layer with the desired high polarization, in addition to light stability, as taught by Sekine.

Regarding claim 9, Larson teaches that the polymer matrix phase is optionally (may be) birefringent (column 6, lines 35-40), which means that it can be optically isotropic (non-birefringent), while the liquid crystal (LC) phase is optically anisotropic (high birefringence) (column 6, lines 40-50).

Claim 10 has been discussed above.

Regarding claim 11, Larson teaches that the PSSE layer transmits approximately 90 % via the pass axis and 30 % via the rejection axis, which respectively overlap the claimed range of maximum transmittance of all rays of more than 75% and the claimed range of minimum transmittance for all rays of less than 60% (column 7, lines 1-20).

Regarding claim 12, Larson teaches that the difference between the refractive index of the optically isotropic phase (polymer matrix) and the refractive index of the optically anisotropic phase (LC) is less than 0.05 (matches) along a direction (ordinary or extraordinary) in a surface plane of the polymer dispersed liquid crystal film (PDLC structure) (column 6, lines 30-40).

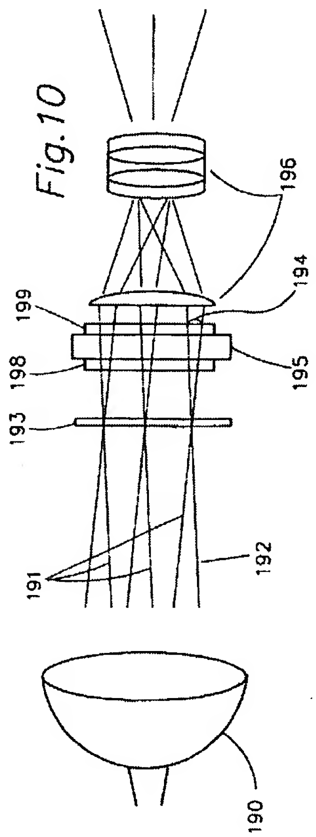
Claim 13 has been discussed above.

Regarding claims 14-15, Larson teaches that the linearly polarizing PDLC layer comprises droplets (column 6, lines 20-25) or particles of optically anisotropic (birefringent liquid) crystals (column 5, lines 60-70) which is a discontinuous phase, embedded in a polymer

matrix which is the continuous phase, and is optically isotropic (non-birefringent) (column 8, lines 45-50). Larson teaches that the amount of scattering in the vertical axis can be controlled by controlling the length scale of the droplets (column 13, lines 45-50). Thus the claimed mean particle size of 0.01 to 1.0 microns is the result of routine experimentation by one of ordinary skill in the art at the time the invention was made, in order to obtain the desired vertical scattering properties.

Regarding claim 16, Larson teaches that the film is uniaxially stretched to elongate the droplets of liquid crystal (column 6, lines 30-40), and that the amount of scattering in the vertical axis can be controlled by controlling the length scale of the droplets (column 13, lines 45-50). Thus the claimed amount of stretch of the film by ten times or less is the result of routine experimentation by one of ordinary skill in the art at the time the invention was made, in order to obtain the desired vertical scattering properties.

Regarding claim 17, Larson teaches an absorbing rear polarizer 198 in Fig 10 (column 13, lines 55-65) below, and a polarizing element of light scattering kind (PSSE layer 193) with an axis having the polarizing plane which gives the maximum transmittance for all rays, parallel to the transparent axis of the polarizing element of light absorbing kind (output polarization rays of 193 match the pass-axis of the rear polarizer 198) (column 14, lines 1-10). It can be seen from Fig. 10 of Larson below, that the polarizing plane of the light scattering-polarizing element 193, has a polarization plane perpendicular to the surface plane of said element 193, since the transmitted rays are perpendicular to the surface plane of the element.



Regarding claims 18-19, Larson teaches a liquid crystal display (LCD) which comprises a liquid crystal cell (10) and comprises a pair of polarizing plates (15, 16) sandwiching the liquid crystal cell (10), wherein the optical light scattering (pre) polarizing film (17) is provided between a backlight (13) and the polarizing plate on the backlight side of the cell (16) (column 4, lines 30-35) as seen in the embodiment on the next page.

Larson teaches an absorbing rear polarizer (column 13, lines 55-65) and a polarizing element of light scattering kind (PSSE layer 193) with an axis having the polarizing plane which gives the maximum transmittance for all rays, parallel to the transparent axis of the polarizing element of light absorbing kind (output polarization rays of 193 match the pass-axis of the rear polarizer 198) (column 14, lines 1-10).

Larson fails to teach that the liquid crystal in the PDLC film comprises the claimed formula (I) of Applicant, or to specify that the active matrix LCD (AMLCD) (column 4, lines 25-45) has a transparent electrode and a pixel electrode.

Sekine in view of Larson has been discussed above. Sekine teaches the liquid crystal of formula (I) in a PDLC film. In addition, Sekine teaches that in the active matrix LCD, a thin film transistor (which forms part of the active element electrode of the LCD) is provided on each pixel (column 1, lines 40-50) thus forming a pixel electrode. The transparent common electrode comprising the opposite end of the liquid crystal cell is notoriously well known to one of ordinary skill in the art at the time the invention was made (claim 18).

Sekine teaches that the liquid crystal compound of formula (1) has a large anisotropy of refractive index (column 2, lines 65-70). Hence the layer is highly polarizing due to its large refractive index anisotropy. In addition, Sekine teaches that the compound is more advantageous in stability to light (column 3, lines 1-5).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the liquid crystal compound of Sekine as the liquid crystal in the PDLC film of Larson, in order to obtain a linearly polarizing layer with the desired high polarization, in addition to light stability, as taught by Sekine.

Larson teaches an absorbing rear polarizer 198 in Fig 10 (column 13, lines 55-65) on the next page, and a polarizing element of light scattering kind (PSSE layer 193) with an axis having the polarizing plane which gives the maximum transmittance for all rays, parallel to the transparent axis of the polarizing element of light absorbing kind (output polarization rays of 193 match the pass-axis of the rear polarizer 198) (column 14, lines 1-10).

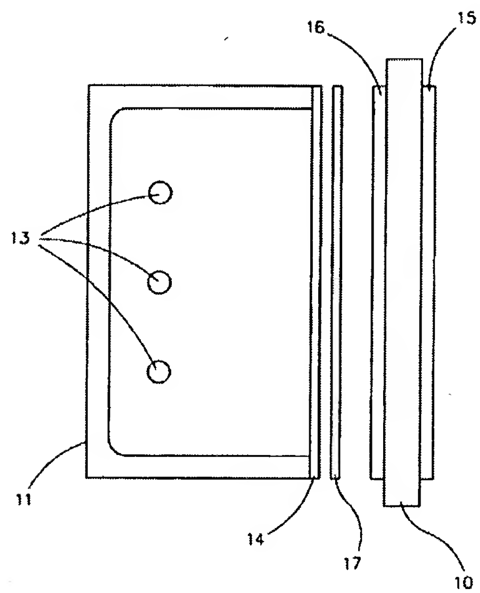


Fig. 1

Larson teaches that the PSSE layer transmits approximately 90 % via the pass axis and 30 % via the rejection axis, which respectively overlap the claimed range of maximum transmittance of all rays of more than 75% and the claimed range of minimum transmittance for all rays of less than 60% (column 7, lines 1-20) (claim 19).

Regarding claims 20-21, Larson teaches that the alignment is fixed (induced alignment locked in by the application of localized UV light) (column 7, lines 65-70 and column 8, lines 1-5) by polymerization of the liquid crystal compound (LC), conducted by exposing the film to ultraviolet light (UV-cure) (column 8, lines 60-70).

5. Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larson in view of Sekine et al. as applied to claims 1-21 above, and further in view of Shen et al. (US 5,672,296).

Larson in view of Sekine has been discussed above and fails to teach that the alignment of the liquid crystal compound in the optical film can be fixed by crosslinking of boric acid.

Shen teaches a polarizing layer (film) which comprises aromatic liquid crystalline polymer, whereby boric acid as a crosslinking agent is well known to those skilled in the art at the time the invention was made (column 2, lines 55-60) (claim 22). The film is immersed in an aqueous solution of the boric acid (column 5, lines 25-35) (claim 23).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used boric acid solution crosslinking, in lieu of the UV light crosslinking process of Larson in view of Sekine, in order to obtain an alternate optical polarizing film with the desired fixed alignment of liquid crystal domains, as taught by Shen.

Response to Arguments

6. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached at (571)272-1498. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Hon.

Sow-Fun Hon

11/04/04